Assignment 10

Complex Numbers; Quadratic Equations in One Variable; Plane Figures

Textbook Assignment: Chapters 15 (164-166), 16, 17 (181-186)

10-1. The coefficient of the imaginary part of the sum of two complex numbers is equal to the
1. sum of the real and imaginary coefficients of the two complex numbers
2. sum of the real coefficients of the imaginary parts of the two complex numbers
3. difference of the imaginary coefficients of the two complex numbers
4. product of the imaginary coefficients of the two complex numbers

10-2. What is the sum of $1 + i$ and $7 - 6i$?
1. $-6 + 7i$
2. $2 + i$
3. $8 - 5i$
4. $8 - 6i$

10-3. What is the product of $1 + \sqrt{-7}$ and $-3 - \sqrt{-11}$?
1. $-3 + \sqrt{77} - i(3\sqrt{7} + \sqrt{11})$
2. $-3 - \sqrt{77} + i(3\sqrt{7} + \sqrt{11})$
3. $-3 + \sqrt{77} + i(3\sqrt{7} - \sqrt{11})$
4. $-3 - \sqrt{77} + i(-3\sqrt{7} + \sqrt{11})$

10-4. What is the simplified product of $3 + i$ and $3 - i$?
1. 8
2. $9 + i^2$
3. $9 - 6i$
4. 10

10-5. How is the conjugate of a complex number formed?
1. By changing the sign of the real part
2. By changing the sign of the imaginary part
3. By multiplying the real part by i
4. By multiplying the imaginary part by i

10-6. Both the sum and product of two conjugate complex numbers are real numbers.

10-7. Which of the following numbers can be represented as the product of two conjugate complex numbers?
1. $3 + 12i$
2. $8 - 12i$
3. 8
4. $12i$

10-8. When dividing one complex number by another you should first multiply the
1. dividend and divisor by the conjugate of the dividend
2. dividend and divisor by the conjugate of the divisor
3. dividend and divisor by i
4. dividend and divisor by $1 - i$

10-9. Which of the following numbers is equal to

$$\frac{8 - i}{2 + i} \ ?$$

1. $1 + i$
2. $1 - 3i$
3. $2 + 2i$
4. $3 - 2i$

10-10. When the expression

$$\frac{2 + i}{i}$$

is simplified, what is the result?

1. $2i$
2. $1 - 2i$
3. $2i + 1$
4. $2i - 1$

10-11. What determines the degree of an equation that contains various powers of x, but no other variables?
1. The number of terms in the equation
2. The number of different powers of x that appear in the equation
3. The highest power of x that appears in the equation
4. The coefficient of the highest power of x that appears in the equation

10-12. What is the coefficient of the constant term in the equation

$$2x^0 - 5x^2 + 3x^1 = 0?$$

1. +2
2. -5
3. +3
4. 0

10-13. What are the coefficients of the equation

$$\frac{3}{2}(x^2 - 12) + 2x = \frac{x^2 - 38}{2} + (x - 1)$$

when it is simplified and put into general form?

1. a = 1, b = -1, c = 2
2. a = 1, b = 1, c = 2
3. a = 1, b = 2, c = -1
4. a = 1, b = -2, c = 1

10-14. The expression $ax^2 + bx + c = 0$ represents a quadratic equation except when

1. a = c
2. a = 0
3. b = c
4. b = 0

10-15. If an equation contains only the single variable x, the number of solutions is determined by the

1. number of terms in the equation
2. number of different powers of x that appear in the equation
3. highest power of x that appears in the equation
4. coefficient of the highest power of x that appears in the equation

10-16. The equation $x^3 - 8 = 0$ has how many roots?

1. One
2. Two
3. Three
4. Four

10-17. Which of the following values of x are roots of the equation

$$x^2 - 8x + 15 = 0?$$

1. x = 1 and x = -7
2. x = 2 and x = 4
3. x = -2 and x = 4
4. x = 3 and x = 5

10-18. The factoring method of solving quadratic equations is based upon the fact that

1. every equation can be factored
2. every quadratic equation can be factored
3. the product of two factors is zero only if at least one of the factors is zero
4. the product of two factors is always greater than zero

10-19. What are the two roots of $x^2 - 100 = 0$?

1. 2, -50
2. 5, 20
3. 10, 10
4. 10, -10

10-20. Assume that you wish to solve a second degree equation by the factoring method. What is your next step after you separate the equation into its factors?

1. Set the product of the factors equal to zero and solve for x.
2. Set each factor equal to zero and solve both equations for x.
3. Set the factors equal to each other and solve for x.
4. Set the factors equal to the original equation and solve for x.

10-21. To solve the quadratic equation

$$3x^2 - 17x - 28 = 0$$

by the factoring method, the equation is first factored into

1. (x - 7)(3x + 4) = 0
2. (x + 7)(3x - 4) = 0
3. (3x - 7)(x + 4) = 0
4. (3x + 7)(x - 4) = 0

10-22. One solution of the equation $x^2 - 0.07x + 0.0006 = 0$ is x = 0.01.

10-23. What are the roots when the quadratic equation

$$2x - 48 = -x^2$$

is factored?

1. 12, 4
2. 6, 8
3. 4, -12
4. -8, 6

10-24. What is the relationship between the first-degree term and the constant term in the perfect square trinomial

$$x^2 + bx + c = 0?$$

1. The constant term is the square of the coefficient of the first-degree term.
2. The constant term is the square of $\frac{1}{2}$ the coefficient of the first degree term.
3. The coefficient of the first-degree term is the square root of the constant term.
4. There is no predictable relationship between the first-degree term and the constant term.

10-25. What happens to the original constant term of a quadratic equation when you solve the equation by completing the square?

1. It is squared.
2. It is divided by 2 and squared.
3. It is multiplied by half the coefficient of the x term.
4. It is placed on the right side of the equation.

10-26. When you solve the equation

$$x^2 + 8x - 9 = 0$$

by the method of completing the square, what number do you add to both sides of the equation after you put the constant term in its proper position?

1. 8
2. 16
3. 32
4. 64

10-27. When you solve a quadratic equation by the method of compieting the square, you must first make the coefficient of the x^2 term equal to

1. zero
2. one
3. half the coefficient of the x term
4. the square of half the coefficient of the x term

10-28. When the quadratic equation

$$x^2 + 6x - 1 = 0$$

is solved by completing the square, what results after taking the square root of both sides of the equation?

1. $x + 3 = \sqrt{10}$
2. $x + 3 = \pm 10$
3. $x + 3 = \pm\sqrt{10}$
4. $(x + 3)^2 = \sqrt{10}$

10-29. When the quadratic equation $x^2 + 3x = \frac{1}{3}$ is solved by completing the square, what are the roots of the equation?

1. $\frac{3}{2} \pm \frac{\sqrt{31}}{3}$
2. $\frac{3}{2} \pm \frac{31}{12}$
3. $\pm \frac{3}{2}$
4. $-\frac{3}{2} \pm \frac{1}{2}\sqrt{\frac{31}{3}}$

10-30. Completing the square, like factoring, cannot be used to solve every quadratic equation.

10-31. What number appears under the radical sign when you use the quadratic formula to solve the equation

$$2x^2 - 11x + 1 = 0?$$

1. 37
2. 81
3. 113
4. 146

10-32. When the equation $ax^2 + bx + c = 0$ is solved by completing the square, the resulting quadratic formula represents the solution of all quadratics.

10-33. Which of the following is derived when the equation

$$3x^2 - 5x + 4 = 0$$

is solved?

1. $\frac{5 + i\sqrt{23}}{6}$
2. $\frac{5 - i\sqrt{23}}{6}$
3. $\frac{5 \pm i\sqrt{23}}{6}$
4. $\frac{5 \pm \sqrt{73}}{6}$

10-34. Which of the following may be used to solve the quadratic equation

$$2x^2 - x - 2 = 0?$$

1. $\frac{1 + \sqrt{17}}{4}$
2. $\frac{1 - \sqrt{17}}{4}$
3. $\frac{-1 - \sqrt{17}}{4}$
4. Both 1 and 2 above

10-35. A quadratic equation having real roots may be solved by which of the following methods?

1. Completion of the square and graphing
2. Completion of the square and factoring
3. The quadratic formula and graphing
4. All of the above

10-36. In order to graph the expression $2x^2 + 4x + 3$, it is first necessary to

1. divide the expression by x^2
2. subtract 3 from the expression
3. divide the expression by 24
4. let $2x^2 + 4x + 3$ equal a second variable

10-37. The roots of $ax^2 + bx + c = 0$ lie on the graph of the equation $y = ax^2 + bx + c$ at the points where

1. $x = y$
2. the graph has a maximum or minimum
3. the graph crosses the x-axis
4. the graph crosses the y-axis

10-38. Which of the following statements describes the curve of the equation

$$y = -4(3x + 1) - 5x^2?$$

1. The curve opens upward and crosses the x-axis at 2 points to the left of the y-axis.
2. The curve opens upward and crosses the x-axis at 2 points to the right of the y-axis.
3. The curve opens downward and crosses the x-axis at 2 points to the left of the y-axis.
4. The curve opens downward and crosses the x-axis at 2 points to the right of the y-axis.

10-39. When the value of a in the quadratic

$$y = ax^2 + bx + c$$

is negative, the parabola formed by graphing has a minimum value.

● In answering items 10-40 through 10-42, refer to pages 174 and 175 of the text and the following information.

The relationship between the time of flight (in seconds) and the altitude (in feet) of a projectile is given approximately by the quadratic formula

$$a = vt - 16t^2$$

where v is the muzzle velocity of the projectile. Assuming that a gun having a muzzle velocity of 400 ft per second is fired, the formula for altitude becomes

$$a = 400t - 16t^2$$

10-40. How long after the gun is fired will the projectile hit a surface target?
1. 20 sec
2. 25 sec
3. 30 sec
4. 35 sec

10-41. The negative coefficient of the t^2 term of the formula indicates that the projectile will have a
1. Maximum altitude
2. Minimum altitude
3. Constantly decreasing altitude
4. Constantly decreasing speed

10-42. What will be the maximum altitude reached by the projectile?
1. 750 ft
2. 1,500 ft
3. 1,750 ft
4. 2,500 ft

10-43. What is the smallest value that y can have if $y = x^2 + 10x + 32$?
1. -3
2. 1
3. 5
4. 7

10-44. What is the x-coordinate of the point on the graph of the equation

$$y = 3x^2 - 2x + 17$$

that is closest to the x-axis?

1. $\frac{1}{4}$
2. $\frac{1}{3}$
3. $\frac{2}{3}$
4. $\frac{3}{4}$

10-45. The general form of the quadratic equation has imaginary roots whenever
1. b^2 is less than 4ac
2. b^2 is greater than 4ac
3. 4ac is less than zero
4. 4ac is greater than zero

10-46. What is the other root of a quadratic equation when one of its roots is $2 + i\sqrt{3}$?
1. $-2 + 3i$
2. $2 - i\sqrt{3}$
3. $2 - i\sqrt{-3}$
4. $-2 - \sqrt{-3}$

10-47. Which of the following statements describes the curve of a second degree equation with a discriminant that is equal to zero and an x^2 term coefficient that is positive?
1. The curve reaches a maximum below the x-axis.
2. The curve reaches a maximum on the x-axis.
3. The curve reaches a minimum above the x-axis.
4. The curve reaches a minimum on the x-axis.

10-48. A quadratic equation that can be separated into two identical factors always has a discriminant that is
1. less than zero
2. equal to zero
3. greater than zero
4. not a perfect square

10-49. Which of the following sets of coefficients will give the equation

$$ax^2 + bx + c = 0$$

roots that are rational, unequal, and that do not contain an imaginary term?
1. $a = 2, b = 9, c = 7$
2. $a = -2, b = 2, c = 8$
3. $a = 4, b = 6, c = 5$
4. $a = 6, b = -3, c = -1$

10-50. The roots of $x^2 + 4x + 4 = 0$ are
1. equal
2. unequal
3. positive
4. imaginary

10-51. The roots of the quadratic equation

$$x^2 + x + 1 = 0$$

are
1. real
2. equal
3. rational
4. imaginary

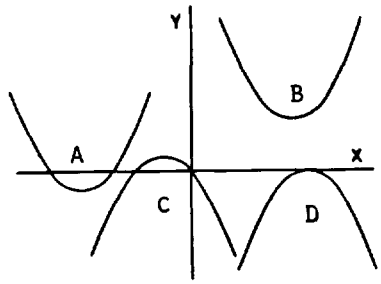


Figure 10A.--Graph of four equations.

● In answering 10-52 and 10-53, refer to figure 10A.

10-52. Which curve is the graph of an equation that has a double root?

1. A
2. B
3. C
4. D

10-53. Which graph is the graph of an equation that has zero as one of its roots?

1. A
2. B
3. C
4. D

10-54. How many points do the x-axis and the graph of the equation

$$y = ax^2 + bx + c$$

have in common when

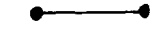
$$b^2 = 4ac?$$

1. None
2. One
3. Two
4. An infinite number

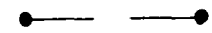
10-55. How many points, if any, do the x-axis and the graph of a quadratic equation have in common when the discriminant of the equation is less than zero?

1. None
2. One
3. Two
4. An infinite number

10-56. Which of the following is a line segment?

1.


2.


3.


4.


10-57. A part BC of the circumference of a circle is designated as

1. broken line BC
2. dashed line BC
3. arc BC
4. line BC

10-58. It two lines intersect and form four equal angles, the lines are said to be

1. oblique
2. parallel
3. concurrent
4. perpendicular

10-59. An acute angle may be defined as an angle of

1. 90 degrees
2. 180 degrees
3. less than 90 degrees
4. more than 90 degrees

10-60. A straight angle is an angle of

1. 90 degrees
2. 180 degrees
3. less than 180 degrees
4. more than 180 degrees

10-61. In figure 17-6 in your textbook, which of the following angles are called vertical angles?

1. 1 and 2
2. 1 and 3
3. 2 and 3
4. 3 and 4

10-62. Which of the following angles are complementary?

1. 43 degrees and 47 degrees
2. 60 degrees and 60 degrees
3. 90 degrees and 30 degrees
4. 100 degrees and 80 degrees

10-63. Which angle has a value twice its own supplement?

1. 60 degrees
2. 80 degrees
3. 100 degrees
4. 120 degrees

10-64. A square cannot be classified as a polygon because it only has four equal angles.

10-65. Which of the following is not a part of a triangle?

1. Arc
2. Apex
3. Base
4. Vertex

10-66. The altitude of any triangle, when drawn, will always lie inside the triangle.

10-67. What is the area of a triangle whose base is 2 feet and whose height is 8 inches?

1. 8 sq ft
2. 16 sq ft
3. 96 sq in
4. 192 sq in

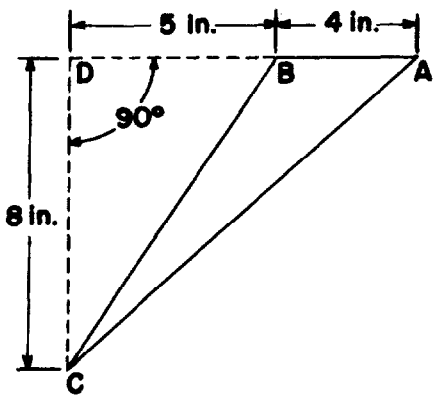


Figure 10B

● In answering item 10-68 refer to figure 10B. [Hint: Area of triangle ABC + area of triangle BCD = area of triangle ACD]

10-68. What is the area of triangle ABC?
1. 16 sq in.
2. 20 sq in.
3. 36 sq in.
4. 72 sq in.

10-69. When a triangle has sides of 15, 20, and 25 units, it is classified as which type?
1. Right
2. Acute
3. Isosceles
4. Equilateral

10-70. If two sides of a triangle are 8 units each, the triangle is classified as
1. right
2. scalene
3. isosceles
4. equilateral

10-71. An equilateral triangle is also an isosceles triangle.

10-72. A right triangle with a 10-degree angle also includes
1. an obtuse angle
2. a supplementary angle
3. a 60 degree angle
4. an 80 degree angle

10-73. If a diagonal of any quadrilateral is drawn, it always divides the quadrilateral into two
1. equal triangles
2. triangles having equal bases
3. triangles neither of which is isosceles
4. triangles neither of which is equilateral

10-74. A quadrilateral is a special example of a parallelogram.

10-75. Rhombus is the name given to a parallelogram whose four sides have equal length.